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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re the Application of: Selzer
Application No.: 09/332,206
Filing Date: June 12, 1999
Title: Method of Improving X-Ray
Lithography in the Sub 100nm
Range to Create High Quality
Semiconductor Devices

Docket No. 1520-006 (1426)
Date: June 7, 2001
Group Art Unit: 2876
Examiner: I. Kiknadze
FAX: 703 305-3594
No. of pages sent: 7

Amendment Under 37 CFR 1.111
Preliminary Amendment

Assistant Commissioner of Patents
Washington, D.C. 20231

Sir:

This is a preliminary amendment for a divisional application of this case. Please amend this application as follows. A credit card payment form for the application fee is attached.

CERTIFICATE OF MAILING

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James H. Leas
Name
James H. Leas
Signature

IN THE CLAIMS:

Please cancel claims 1-10.

Please add the following new claims:

11. A method of exposing a resist on a substrate comprising the steps of:
 - a) providing the substrate with a film of resist;
 - b) placing the substrate on a stage; and
 - c) sensing the position of the substrate with a displacement sensor.
12. The method as recited in claim 11, wherein the substrate comprises a wafer.
13. The method as recited in claim 12, wherein said wafer comprises a semiconductor.
14. The method as recited in claim 11, wherein the method further comprises the step of exposing said resist with radiation.
15. The method as recited in claim 14, wherein said radiation has a wavelength to provide a structure having a dimension less than 100nm.
16. The method as recited in claim 15, wherein said radiation comprises x-ray.
17. The method as recited in claim 16, wherein said x-ray radiation is collimated.
18. The method as recited in claim 16, wherein said x-ray radiation is concentrated.

19. The method as recited in claim 14, further comprising the step of providing a mask for defining exposure of said resist.
20. The method as recited in claim 19, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of moving said stage to adjust said gap.
21. The method as recited in claim 19, further comprising the step of using output of said displacement sensor to control said exposing step.
22. The method as recited in claim 21, wherein said mask is positioned with respect to said substrate, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that position of mask with respect to said substrate is optimum.
23. The method as recited in claim 22, wherein said mask is spaced from said substrate by a gap, said method further comprising the step of exposing said resist at a time when said displacement sensor output indicates that said gap is optimum.
24. The method as recited in claim 19, further comprising the step of using the displacement sensor output to control mask to wafer misalignment.
25. The method as recited in claim 11, further comprising the step of using the displacement sensor output to control substrate x, y, z, rotation, and magnification.
26. The method as recited in claim 11, wherein the displacement sensor comprises a differential variable reluctance transducer (DVRT).

27. A system for exposing a substrate comprising a stepper and an X ray source, vibration insulation there between.
28. A system for exposing a substrate comprising a stepper and an X ray source, said stepper comprising a helium beam transport chamber.
29. A method of exposing a resist on a substrate, said method comprising the steps of:
- providing the substrate with a film of resist;
- placing the substrate on a stage;
- providing a mask comprising a pattern; and
- imaging said pattern on said resist at a precise moment when mask and substrate are in optimum position with respect to each other, wherein optimum position comprises one from the group, gap, x, y, z, rotation, and magnification.
30. The method as recited in claim 29, wherein the substrate comprises a wafer.
31. The method as recited in claim 30, wherein the wafer comprises a semiconductor.
32. The method as recited in claim 29, wherein said imaging comprises the step of exposing said resist with radiation.
33. The method as recited in claim 32, wherein said radiation has a wavelength to provide a structure having a dimension less than 100nm.

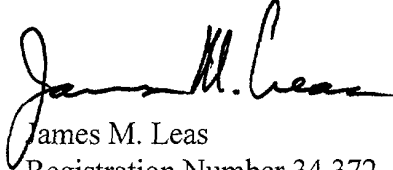
34. The method as recited in claim 33, wherein said radiation comprises x-ray.
35. The method as recited in claim 34, wherein said x-ray radiation is collimated.
36. The method as recited in claim 34, wherein said x-ray radiation is concentrated.

Remarks

Claims 11-36 are pending in the application. Claims 1-10 have been canceled. Claims 11-36 have been added. No new matter has been added by virtue of this amendment. Reconsideration of the application as amended is requested.

It is believed that the claims are in condition for allowance. Therefore, applicant respectfully requests favorable reconsideration. If there are any questions please call applicant's attorney at 802 864-1575.

Respectfully submitted,
For: Selzer et al.

By: 
James M. Leas
Registration Number 34,372
Tel: (802) 769-9824

James M. Leas
37 Butler Drive
S. Burlington, Vermont 05403